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ABSTRACT

This guide was planned for a program to acquaint seventh and eighth grade students with the importance of the computer in society and to ensure uniformity of instructional objectives among teachers assigned to teach a beginning-level course in computer literacy. It includes the history of the computer, operating and controlling the computer, applications of the computer and its influence on daily activities, limitations of the computer, and moral and ethical issues related to the growing computer age. The major portion of the course is geared toward the BASIC programming language and the TRS-80 microcomputer. The guide is divided into 16 units of study (1-9 for the seventh grade and 10-16 for the eighth grade); it has also been used with a one-semester high school elective course. For each unit, the purpose, resource materials, teacher preparation, content objectives, presentation activities, and procedures for assessment are described. Also included are 17 study guides for student use, a 34-item reference list for teachers, and an index. (LMM)

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A TEACHER'S GUIDE

COMPUTER LITERACY FOR THE MIDDLE GRADES

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Grateful acknowledgment is made to the members of the Computer Literacy Committee that developed the primary goals for a beginning level course and to the Board of School Directors who provided the resources required to implement a Computer Literacy Program.

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James F. McCaffery

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Foreword

The purpose of this course of study is to ensure uniformity of instructional objectives among those teachers who are assigned to teach Abington's beginning level course in computer literacy. The term "computer literacy" is used here to describe the general body of knowledge needed to deal adequately with the computer-oriented world. In general, the course includes study of the following topics: (1) history of the computer, (2) operating and controlling the computer, (3) applications of the computer and its influence on daily activities, (4) limitations of the computer, and (5) moral and ethical issues related to the growing computer age.

The substance of the course, designed to be offered to all seventh and eighth grade students as a part of the junior high school cycle program, is divided into sixteen units of study. Units one through nine, lessons 1-18, comprise the seventh grade program. Units ten through sixteen, lessons 19-36, comprise the eighth grade program. Some lessons within a unit may span more than one forty-five-minute instructional period.

This course is offered, also, as a one semester (thirty-six-hour) elective in the high school. In this instance, the course is made available to those ninth and tenth grade students who have not participated in the junior high school program.

Three-fourths of all the lessons require students to work in front of a microcomputer. The major portion of this course is geared toward one computer language, BASIC, and one microcomputer, the Radio Shack TRS-80.

The computer laboratory equipped specially for the course has a minimum of thirteen 16K student computers and one 32K computer for the teacher. Additional hardware components include a line printer and a network control unit which allows the users (teacher and students) to exchange data efficiently among the computer in the laboratory. In some cases, two students will need to share a

microcomputer. When students are sharing a computer, each student needs time on his own to "interact" with the computer.

Another important instructional tool required for the course is a 3/4" video cassette playback unit. The following aspects of the course depend upon television lessons:

- the history of computing
- computer applications
- programming languages
- the moral and ethical issues related to the wide-spread use of computers

Teachers may choose titles from among two video/film series. The television series known as Adventure of the Mind, produced by John Hopkins University Applied Physics Laboratory and the ITV CO-OP, includes six fifteen-minute lessons and focuses on personal computing. Computer Programme, produced by BBC-TV, includes ten twenty-five minute lessons and aims to de-mystify fundamental aspects of computing in a relaxed and amusing way.

The teacher will find the following textual components within each instructional unit in the course of study:

- statement of purpose
- listing of resource materials
- suggested teacher preparation
- content objectives
- presentation activities
- procedures for assessment

The teacher will find also seventeen (17) student study guides, and an in-depth index to the textual material.

The course "Computer Literacy in the Middle Grades" presents an exciting opportunity for the teacher and students. The emphasis of student goals shifts from that of acquiring information and understanding information about computing to manipulating and controlling a computing environment. In some instances, students will be "interacting" with a computer for the first time. They will learn not only about computing and its effect on our daily lives, but also they will spend most of their instructional time learning to "talk" to the computer in a language it can understand. There can be no doubt that, by the conclusion of the thirty-six hour course, students will have taken one major step toward mastering a powerful technology.

Grace E. Shope
7 August 1981
Revised Edition
28 July 1982

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1

Getting Started with the Computer

Purpose: As a result of this unit students will recognize the operational procedures for the course, will acquire a brief description of computer literacy, will experience the calculating speed, degree of accuracy, and information storage capabilities of computers, and students will experience the ability of computers to "interact" with people.

Resource Materials:

1. Definition of computer literacy: Computer literacy is a term used currently in Abington to describe a course that includes the following topics: (1) History of the Computer, (2) Operating and Controlling the Computer, (3) Applications of the Computer and Its Influence on Daily Activities, (4) Limitations of the Computer, and (5) Moral and Ethical Issues Related to the Growing Computer Age.
2. "Invitation to TRS-80 Computing, Level I": Orientation Cassette/disk.

Teacher Preparation:

1. Prepare to tell the students how the course will operate; e.g., classroom rules, taking care of equipment, keeping a computer literacy notebook, homework, testing, grading.
2. Prepare a definition of "computer literacy."
3. Load "Invitation to TRS-80 Computing, Level I" from cassette/disk onto the microcomputers.
4. Plan for a series of bulletin boards or other displays that will highlight . . . careers in computers and data processing, educational qualifications necessary for entry and advancement in various computer-related jobs, effects of computerization on employment. Start a

collection of magazine and newspaper clippings, advertisements, puzzles, cartoons and jokes about computers. Ask the students to suggest what your collection reveals about the public's feeling toward computers.

Content Objectives:

1. To define computer literacy.
2. To experience the use of the computer.
3. To understand that the fear, anxiety, or intimidation people feel as a result of some computer experiences is real.

Presentation Activities: [Lesson 1]

1. Oral presentation, including orientation to the course, classroom management procedures, and what the students can expect.
2. Develop an operational definition of computer literacy.
3. Use the orientation cassette/disk, "Invitation to TRS-80 Computing, Level I," to demonstrate to the students what is involved in "interacting" with the computer. If students are sharing a computer, be sure each student has an opportunity to "interact" with the computer program.
4. Generate a discussion on the types of tasks performed by the computer program. Focus the discussion on how the students felt about the experience.

2

The History of the Computer

Purpose: As a result of this unit students will recognize the unique characteristics of the computer and why it has played such an important role in the development of a modern technological society.

Resource Materials:

1. Computer Parts Kit [with Teacher's Guide].
2. Hardware and Software: Computer Components and Functions (Adventure of the Mind series) and It's Happening Now (Computer Programme series).
3. "History of Computing" in Fundamentals of Digital Computers by Donald D. Spencer, pp. 43-61.
4. "The History of Computing" in Computer Literacy by Carin Horn and James Poirot, pp. 27-43.
5. "Why Do Computers Exist?" in Are You Computer Literate? by Karen Billings and David Moursund, pp. 27-38.

Teacher Preparation:

1. Prepare to sketch briefly for the students the development of computing from the primitive calculators to modern computers. The emphasis is placed on those twentieth century events and inventions (1946-date) that enhanced: (1) the computer's calculating reliability and speed, (2) the computer's information storage and control capabilities, and (3) the computer's ability to handle input and output.
2. Prepare to show and discuss the video cassette, Hardware and Software: Computer Components and Functions.
3. Have copies of Study Guide No. 1 ready for students.
4. Have Computer Parts Kits available to demonstrate, in a concrete way, the effect that miniaturization has had on the development of modern computers.

The History of the Computer

Content Objectives:

1. To identify three or more unique characteristics of a computer; e.g., calculating accuracy and speed, ability to control devices, ability to store and recall information (data), ability to simulate reality.
2. To name three or more inventions that led to the development of the modern microcomputer; e.g., change from mechanical to electronic signals to do calculations, stored-program concept, vacuum tubes, transistors, integrated circuits, microchips.
3. To name three advantages resulting from the use of computers in daily life; e.g., ability to process rapidly large amounts of information, handle complex calculations, save money, create new jobs.

Presentation Activities: [Lesson 2]

1. Distribute Study Guide No. 1. Sketch the development of computing from the primitive calculator to modern computers. Use the Computer Parts Kit to demonstrate the change from vacuum tubes to the microchip technology.
2. (15 min.) Show the video cassette, Hardware and Software: Computer Components and Functions.
3. In a discussion, based on class lecture and video cassette presentation, ask the students to recall:
    a. Unique characteristics of a computer.
    b. Inventions which led to the development of the modern microcomputer.
    c. Advantages to mankind resulting from the use of computers.
4. Encourage students to contribute cartoons, puzzles, advertisements, etc. about computing for inclusion on the class bulletin board.
5. Optional Activity: Arrange with the school librarian to reserve space and time during the school day for students, in small groups, to view independently the video program, It's Happening Now (Computer Programme series).

3

Operating the Computer

Purpose: As a result of this unit students will know the five basic parts of a computer system, will have some familiarity with the computer keyboard, and will know the procedures for entering and executing and ending a simple computer program.

Resource Materials:

1. "Computer Jargon," pp. 11-25; "Computer Components," pp. 167-185 in Computer Literacy by Carin Horn and James Poirot.
2. Getting Started with TRS-80 BASIC: Use with Models I and III.
3. TRS-80 Model III: Operation and BASIC Language Reference Manual.

Teacher Preparation:

1. Prepare to review the functions of the five hardware (input, control, arithmetic/logic, memory, output) and two software (applications and system) computer components that were introduced in the video cassette, Hardware and Software: Computer Components and Functions.
2. Prepare to introduce students to:
   a. Program Statements: CLS, PRINT, END, and variations of the PRINT statement, e.g., use of the comma and semicolon.
   b. Program Commands: NEW, RUN, and LIST.
   c. Keyboard Functions: CLEAR, ENTER, BACKSPACE, and SPACEBAR.
   d. Video Display: Ready, Cursor, Prompt, Cass?, and Memory Size?
   e. Programming: Line number.
3. Have copies of Study Guides No. 2, 3, and 13 ready for students.
4. Have available an overhead projection transparency that shows the TRS-80 keyboard.

Operating the Computer

Content Objectives:

1. To discriminate between computer hardware and software.
2. To list the five hardware components of a computer and the function of each.
3. To list the two software components and identify the functions of each.
4. To execute a simple program using BASIC statements: CLS, PRINT and END; using BASIC commands: NEW, RUN, and LIST; keyboard functions: CLEAR, ENTER, BACKSPACE, and SPACEBAR; and using video display functions: Ready, Cursor, Prompt, Cass?, and Memory Size?

Presentation Activities: [Lesson 3]

1. Distribute Study Guide Nos, 2 and 3. Review computer hardware and software components and introduce the BASIC statements and commands that will be used during the "hands-on" practice exercises.
2. Practice activities include:
    a. Powering-up the microcomputer.
    b. Printing strings, e.g., name, room number, to demonstrate functions of the comma and semicolon.
    c. Correcting mistakes using the Backspace key or retyping a line.
    d. Making additions or changes in a program.
    e. Listing a program.
    f. Executing a program.
    g. Understanding the most frequently used ERROR MESSAGE codes, Study Guide No. 13.

4

Controlling the Computer, Part I

Purpose: As a result of this unit students will follow a five-step process to generate computer programs in BASIC. The process includes the following steps: (1) Defining the problem, (2) Selecting or developing an appropriate algorithm, (3) Preparing a flowchart, (4) Coding (writing) the algorithm into BASIC, and (5) Testing the program until it is working. Students will write programs using LET, string and numeric variables, variations of PRINT, GOTO, and IF . . . THEN statements. Students will know, also, the similarities and differences among adding machines, calculators, and computers; and they will identify several methods of communicating with a computer.

Resource Materials:

1. "Algorithms and Flowcharting" and "Computer Programming and Design Logic" in Computer Literacy by Carin Horn and James Poirot, pp. 187-225.
2. Getting Started with TRS-80 BASIC: Use with Models I and III.
3. How to Solve It (2nd edition) by George Polya, p. xvii.
4. Sharp EL-210 electronic calculators.
5. The Secret Guide to Computers (Volumes 1 and 2) by Russell M. Walter.
6. Speaking the Language: Communication with Computers (Adventure of the Mind series) and One Thing After Another (Computer Programme series).

Teacher Preparation:

1. Prepare to show one of the following video cassettes: Speaking the Language: Communication with Computers or One Thing After Another. In a follow-up activity, emphasize the methods used to communicate with a computer.

Controlling the Computer, Part I

2. Prepare a series of five lessons for introducing students to the following concepts:
    a. LET
    b. String and Numeric Variables
    c. Review of Print Variations
    d. Order of Arithmetic Operations
    e. Flowcharting
    f. GOTO
    g. Break Key
    h. CONT
    i. Generating Numbers with an Infinite loop
    j. IF . . . THEN
    k. Use of Counter
    l. Inequality Symbols:
        (1) > greater than
        (2) < less than
        (3) >= greater than or equal to
        (4) <= less than or equal to
        (5) <> not equal to (less than or greater than)
    m. Use of Flag Variables
3. Have copies of Study Guides Nos. 4, 5, and 6 ready for students.

Content Objectives:

1. To know the similarities and differences among adding machines, calculators, and computers.
2. To identify three or more methods of communicating with a computer; e.g., keyboard, voice through a microphone, punched cards, tape, disk, light pen.
3. To know that a computer program is a series of instructions written in a special language that the computer can understand.
4. To know that a program is written so that the computer may perform a task or job.
5. To know that computer instructions are a detailed step-by-step description of the actions which a computer must perform in order to process correctly the information given to it.

Controlling the Computer, Part I

6. To understand and use the five-step program development process.
7. To write programs using BASIC statements: CLS, PRINT, END, LET, GOTO, and IF...THEN.

Presentation Activities: [Lessons 4, 5, 6, 7 and 8]

1. (15 min.) Show one of the video cassettes, Speaking the Language: Communication with Computers or One Thing After Another.
2. Generate a discussion, based on the video presentation, that will focus on:
    a. What are the methods by which people can communicate with computers?
    b. What are computer instructions?
    c. Why is the sequential order of instructions important?
    d. What computer language statements or conventions mentioned in the video cassette have been used so far in this course to tell the TRS-80 what to do?
3. Distribute Study Guide No. 4. Introduce students to:
    a. LET statements
    b. String and numeric variables
    c. Order of arithmetic operations
    d. Review variations of the PRINT statement
    e. Use pencil and paper to practice manipulating the Order of Arithmetic Operations
4. Laboratory Lesson. Lead the students through the following types of problems:
    a. Write a program to combine two or more numbers using different binary operations. Use the LET statement to assign variables and include variations of the PRINT statement in the program.
    b. Write a program to average four numbers.
    c. Write a program to add together the first five integers.
    d. Introduce a standard format for including student's name, date, and program title (optional).
5. Generate an activity to create a need for flowcharting.

Controlling the Computer, Part I

a. Give the students a hand-held calculator exercise.

b. Discuss the similarities and differences between operating the Sharp EL-210 electronic calculator and programming the microcomputer.

c. Introduce flowcharting concepts. Distribute Study Guide No. 5.

d. Introduce GOTO and the BREAK key.

6. Microcomputer Practice Activities. Lead the students through a program that includes an infinite loop.

```
Example:  10 CLS
          20 PRINT "TRS-80"
          30 GOTO 20
          40 END
```

a. Use the BREAK key to get out of the infinite loop.

b. With the same program use variations of the PRINT statement; e.g., comma, semicolon.

7. Introduce a program with an infinite loop to generate numbers. Modify the program with an
practice activities include:

a. Flowcharting

b. Counter

8. Introduce the inequality symbols and review the following concepts: Counter, IF . . . THEN, and GOTO. Distribute Study Guide No. 6. In the practice activities prepare a flowchart and code problems that include inequality symbols.

5

Controlling the Computer, Part II

Purpose: As a result of this unit students will be aware there are several programming languages that have evolved over a period of time for particular applications in science, national defense, business, and education.

Resource Materials:

1. Byte (magazine). Logo, see August 1982; Smalltalk, see August 1981.
2. Fundamentals of Digital Computers by Donald D. Spencer. "Writing the Program, pp. 145-158; "BASIC Programming," pp. 159-174; "FORTRAN Programming," pp 175-199; "COBOL Programming," pp. 201-222; "Number Systems," pp. 287-296.
3. "The Lowdown on Languages" and "Parlez-Vous PILOT? Sprechen Sie BASIC? Deciding Which Language Is Best for You," Classroom Computer News, July-August, 1981, pp. 40-45.
4. "Microelectronics and the Personal Computer" Scientific American, September 1977, pp. 231-244.
5. The Secret Guide to Computers (Volumes 7 and 8) by Russell M. Walter.
6. Talking to a Machine (Computer Programme series).

Teacher Preparation:

1. Prepare to sketch briefly for the students the development of computing languages. Ask: Why were different computer languages developed? How are they used today?
2. Have copies of Study Guide No. 7 ready for students.
3. Prepare a 15 minute quiz that will serve as a review or recall of the major concepts introduced in units one through five.
4. Have copies of Study Guide No. 8, "Computer Literacy Puzzle," ready

Controlling the Computer, Part II

for students to complete and to include as a part of their computer literacy notebook.

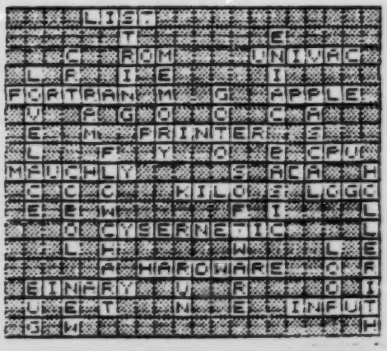
Content Objectives:

1. To understand how and why different computer languages were developed and are used today; e.g., machine and assembler languages and the high-level languages that are more like mathematical or natural languages.
2. To recognize that there are several high-level computer languages and that there can be more than one dialect within a given language; e.g., BASIC, COBOL, FORTRAN, Pascal, Logo, ADA, Smalltalk, Pilot.
3. To understand that the high-level language programs are translated by a computer into machine language; i.e., represented in binary form.

Presentation Activities: [Lesson 9]

1. Sketch the development of computing languages. Include in your examples: BASIC, COBOL, FORTRAN, Pascal, Logo, ADA, Smalltalk, Pilot. Distribute Study Guide No. 7, a listing of computer terms. Give examples to illustrate the meaning of the following terms: Memory size, Random Access Memory (RAM), Read-Only Memory (ROM), K, Byte, Bit (Binary Digit), POKE, and PEEK.
2. Use PEEK and POKE to illustrate the concept of machine language.
3. Give a quiz to measure recall of major concepts introduced in units one through five.
4. Optional Activity: Arrange with the school librarian to reserve space and time during the school day for students, in small groups, to view independently the video program, Talking to a Machine (Computer Programme series).
5. Optional Review Activity: Study Sheet No. 8, "Computer Literacy Puzzle."

Answers



Puzzle created using Crossword Magic from L & S Computerware

6

Computer Applications:

Influence on Daily Activities

Purpose: As a result of this unit students will name four or more ways a computer can serve as a tool; and they will name three or more ways a computer extends an individual's mental capabilities.

Resource Materials:

1. "Computer Applications" and "Computers in Government" in Computer Literacy by Carin Horn and James Poirot, pp. 45-93.
2. General Encyclopedias; e.g., Encyclopaedia Britannica, Colliers, Merit Student Encyclopedias, World Book.
3. "How Computers Affect People" in Are you Computer Literate? by Karen Billings and David Moursund, pp. 91-109.
4. The Personal Touch: Computers as Personal Tools (Adventure of the Mind series).
5. "Using Computers" in Fundamentals of Digital Computers by Donald D. Spencer, pp. 9-41.

Teacher Preparation:

1. Prepare to show and discuss the video cassette, The Personal Touch: Computers as Personal Tools.
2. Prepare to discuss the difference between a "dedicated" computer and a "programmable" computer.
3. Have copies of Study Guide No. 9 ready for students to complete as a homework exercise.

Content Objectives:

1. To recognize the uses of computer technology in the home; e.g., heating and cooling, cooking, home security, money management,

recreational games, self-education.

2. To recognize the uses of computer technology in the work place; e.g., business, industry, communications, government, health service agencies, education.
3. To recognize the difference between a dedicated computer and a programmable computer.
4. To recognize ways a computer extends an individual's mental capabilities; e.g., extend memory, speed up computations or logic processes, sort data, accelerate information transfer.

Presentation activities: [Lesson 10]

1. (15 min.) Show the video cassette, The Personal Touch: Computers as Personal Tools.
2. Generate a brainstorming session, based on the video presentation, that will focus on:
   a. What activities in a student's personal life might be helped by the application of a dedicated computer?
   b. What activities in a student's personal life might be helped by the application of a programmable computer?
   c. What items are available in department stores that incorporate a microprocessor?
3. Introduce homework exercise, Study Guide No. 9, which is based on the information presented in the video cassette, The Personal Touch. This exercise asks the students to:
   a. Name three or more ways in which a computer may be used to enhance an individual's mental capabilities.
   b. List ten or more ways a computer may be used...
      (1) in the home?
      (2) in education?
      (3) in business?
      (4) in medicine?
      (5) in art and music?

7

Controlling the Computer, Part III

Purpose: As a result of this unit students will write programs that require INPUT and READ-DATA statements. Students will use the cassette recorder to save and load programs. They will recognize the uses of the classroom's line printer and Network Controller.

Resource Materials:

1. "Beginning BASIC" in Computer Literacy by Carin Horn and James Poirot, pp. 227-273.
2. Computer Parts Kit [with Teacher's Guide].
3. Computer Programming in the BASIC Language (2nd edition) by Neal Golden.
4. Getting Started with TRS-80 BASIC: Use with Model I and III.
5. The Secret Guide to Computers (Volumes 1 and 2) by Russell Walter.
6. TRS-80 Model III: Operation and BASIC Language Reference Manual.

Teacher Preparation:

1. Prepare a series of five lessons for introducing students to the following concepts:
    a. CSAVE
    b. FILE NAME
    c. CLOAD
    d. CLOAD?
    e. INPUT
    f. READ-DATA
    g. LPRINT
    h. LLIST

i. Uses of the line printer and Network Controller
j. Hard copy/soft copy
k. Other input-storage-output devices

2. Have copies of Study Guide Nos. 10, 11, and 12 ready for students.

Content Objectives:

1. To use the cassette recorder as an input-output device for the TRS-80.
2. To use the five-step process for developing a computer program.
3. To write programs using the following BASIC statements: CLS, PRINT, END, LET, GOTO, IF . . . THEN, INPUT AND READ-DATA.
4. To use the line printer as an output device for the TRS-80.
5. To understand the value of the Network Controller in an instructional computer laboratory.

Presentation Activities: [Lessons 11, 12, 13, 14 and 15]

1. Distribute Study Guide No. 10. Introduce students to the cassette recorder as an input-output device. Illustrate the use of: CSAVE, FILE NAME, CLOAD, and CLOAD?
2. Introduce practice exercises that include: Counter with IF . . . THEN, LET, and GOTO statements. Have the students save one program on a cassette for use during the next laboratory session. Lead the students through the following types of problems:
    a. Print even integers from 2-100.
    b. Print integers 1-25 in five equal groups.
3. Introduce the INPUT statement. In the microcomputer practice activities have the students:
    a. Load onto the computer the cassette tape program that was saved from the previous day.
        (1) Review CLOAD
        (2) Modify the program on the cassette tape to replace the LET statement with an INPUT statement.

(3) Use INPUT with a prompt statement.

b. Write a program to add two numbers using the INPUT statement.

c. Save program on a cassette tape.

d. Use INPUT with a string variable (optional exercise).

4. Introduce READ-DATA. Review the need to flowchart problems before they are coded into BASIC language. In the microcomputer practice activities lead the students through the following problems:

   a. Review CLOAD (use the cassette saved from previous lesson).

   b. Modify the program to include READ-DATA with separate variables for each item of data.

   c. Introduce the flag (DUMMY DATA).

   d. Write a program to include READ-DATA with a loop.

5. Distribute Study Guide No. 11. Review READ-DATA. Flowchart a problem that includes a READ-DATA statement. Lead the students through the following types of problems:

   a. Analyze programs with READ-DATA statements.

      (1) Determine the function of the READ-DATA statement.

      (2) Trace the execution of the program.

      (3) Debug a program using READ-DATA.

   b. Write a program to average four numbers.

   c. Write a program to average five groups of four numbers.

6. Distribute Study Sheet No. 12. Use the Computer Parts Kit to demonstrate the input-output media.

   a. Introduce uses of the line printer and the Network Controller.

   b. Introduce LPRINT and LLIST.

   c. Review CLOAD and CSAVE.

   d. Define the terms:

      (1) Hard copy

      (2) Soft copy

   e. Show examples to illustrate input-storage-output devices; e.g., punched computer cards, punched paper tape, paper printout, floppy disk, magnetic disk, microfiche, typewriter/teletype, magnetic core, and magnetic tape.

8

Practice and Recall of Major Computer Literacy Concepts, Part I

Purpose: As a result of these two lessons students will practice and recall the major concepts introduced in Units one through seven.

Resource Materials:

1. Computer Literacy Curriculum Guide, units one to seven.
2. Abington School District Computer Literacy Assessment, Part I.

Teacher Preparation:

1. Review the major concepts introduced in units one through seven.
2. Prepare practice exercises for review.
3. Prepare to review study guides with the students.
4. Have copies of Study Guide No. 13 ready for students.

Content Objectives:

1. To review and practice the major computer literacy concepts introduced in units one through seven.
2. To test for recall of the major computer literacy concepts.

Presentation Activities: [Lessons 16 and 17]

1. Guide the students through a review of their Computer Literacy Notebooks.
2. Assign practice exercises that include the following BASIC statements: CLS, PRINT, END, LET, GOTO, IF ... . THEN, INPUT, and READ-DATA.
3. Test for recall. Use the Abington School District Computer Literacy Assessment, Part I.

9

Interacting with Computer Software Programs, Part I

Purpose: As a result of this unit students will be aware of the types of popular consumer software programs available for use on microcomputers.

Resource Materials:

1. Samples of commercially produced software programs.
2. Games and utility programs listed in books and magazines:
    a. BASIC Computer Games TRS-80 Edition by David Ahl.
    b. BASIC Fun by Susan Lipscmb and Margaret Zuanich.
    c. Creative Computing Magazine
    d. More BASIC Computer Games TRS-80 Edition by David Ahl.
3. Model programs created by teachers and students.

Teacher Preparation:

1. Select sample software programs that illustrate computer application for drill and practice activities, tutorials, simulations, utility (tools to perform a particular task), entertainment.
2. Prepare to load several different types of programs from cassette(s)/ disk onto the microcomputers.
3. Prepare to discuss some of the purposes of software programs produced for the home and school.
4. Have copies of Study Guide No. 14, Library Resources for Students, ready for students.

Content Objectives:

1. To recognize the uses of microcomputers in education, e.g., drill and practice, tutorial, simulation, utility.

Interacting with Computer Software Programs, Part I

2. To recognize the uses of microcomputers in the home; e.g., hobbies, entertainment, utility, education.
3. To recognize that computerization projects are limited by hardware and software costs, software availability, and storage capacity.

Presentation Activities: [Lesson 18]

1. Have the students interact with a variety of microcomputer software programs; e.g., drill and practice, tutorial, simulation, utility, recreational game.
2. Use Scripsit to demonstrate the text editing (word processing) capabilities of microcomputers.
3. Generate a discussion on the types of tasks performed by the software programs. Focus the discussion questions on:
    a. How did the students feel about the experience?
    b. Were the programs effective?
    c. Are the programs cost effective?
4. Distribute Study Guide No. 14. Highlight some of the book, audiovisual, and magazine titles that are available in the school library for students.

THIS UNIT MARKS THE END

OF THE SEVENTH GRADE PROGRAM

10

Controlling the Computer, Part IV

Purpose: As a result of this unit students will recall and write programs using the five-step program development process. Student will write programs that include: CLS, PRINT, END, LET, GOTO, IF . . . THEN, INPUT, READ-DATA, and FOR . . . NEXT . . . STEP.

Resource Materials:

1. "Algorithms and Flowcharting," pp. 187-211; "Computer Programming and Design Logic," pp. 213-225; and "Beginning BASIC," pp. 227-273; in Computer Literacy by Carin Horn and James Poirot.
2. Coputer Programming in the BASIC Language (2nd edition) by Neal Golden.
3. Diagnostic Test.
4. Getting Started with TRS-80 BASIC: Use with Model I and III.
5. How to Solve It by George Polya, p. xvii.
6. "How to Solve It - with the Computer," by Donald T. Piele. Creative Computing, August 1981, pp. 110-120.
7. "Invitation to Computing, Level II": Orientation cassette/disk.
8. The Secret Guide to Computers (volumes 1 and 2) by Russell M. Walter.
9. TRS-80 Model III: Operation and BASIC Language Reference Manual.

Teacher Preparation:

1. Prepare to tell the students how the Computer Literacy Course, Part II, will operate; e.g., classroom rules, taking care of equipment, keeping a computer literacy notebook, homework, testing, grading.

Controlling the Computer, Part IV

2. Prepare a diagnostic test or review guide of the major computer literacy concepts that were introduced in Units one through nine.
3. Prepare discussion activities that address three or more methods of communicating with a computer.
4. Prepare a series of three lessons that review the following concepts:
    a. BASIC Commands: NEW, RUN, LIST, and CONT.
    b. BASIC Statements: CLS, PRINT, END, LET, GOTO, IF...THEN, INPUT, and READ-DATA.
    c. BASIC Conventions:
        (1) String and Numeric Variables
        (2) Order of Arithmetic Operations
        (3) PRINT Variations
        (4) Five-step Process for Developing a Computer Program
        (5) Flowcharting
        (6) Inequality Symbols
        (7) Error Messages
        (8) Line Numbers
    d. TRS-80 Keys: ENTER, Backspace, Spacebar, CLEAR, SHIFT, and BREAK.
    e. Video Display: Ready, Cursor, and Prompt.
5. Prepare two lessons for introducing the FOR . . . NEXT . . . STEP statement. In the practice activities include:
    a. IF . . . THEN
    b. Counter
    c. Automatic increment
    d. Negative step
    e. Decimal step
6. Have copies of Study Guides Nos. 1-6, 11, 13, 14, and 15 ready for students to include in their computer literacy notebook.

Content Objectives:

1. To identify three or more methods of communicating with a computer.
2. To know that a computer program is a series of instructions written

in a special language which the computer can understand.

3. To know that a program is written so that the computer may perform a task or job.
4. To practice using the five-step process for developing computer programs.
5. To write programs using the following BASIC statements: CLS, PRINT, END, LET, GOTO, IF . . . THEN, INPUT, READ-DATA, and FOR . . . NEXT . . . STEP.

Presentation Activities: [Lessons 19, 20, 21, 22 and 23]

1. Oral presentation including orientation to the course, classroom management procedures, and what the students can expect.
2. Define computer literacy.
3. Use orientation cassette/disk "Invitation to TRS-80 Computing, Level II" to review for the students what is involved in "interacting" with the computer.
4. Generate a discussion on the types of tasks performed by the computer program.
5. Give a diagnostic test or proceed with review.
6. Generate a variety of classroom activities that will focus on:
    a. Five-step process for writing computer programs
    b. Review of BASIC commands
    c. Powering-up the TRS-80 microcomputer with:
        (1) String and numeric variables
        (2) Variations of the PRINT statement
        (3) Order of arithmetic operations
        (4) LET and GOTO

7. Distribute Study Guides Nos. 1-6, 11, 13 and 14. Review flowcharting and inequality symbols. Write programs that include:
    a. IF . . . THEN, INPUT, and READ-DATA statements
    b. Flag value

Controlling the Computer, Part IV

8. Distribute Study Guide No. 15. Review IF . . . THEN and introduce FOR . . . NEXT . . . STEP. Introduce the following variations of FOR . . . NEXT...STEP:
    a. Automatic step
    b. Negative step
    c. Decimal step
9. Analyze programs that include variations of the FOR . . . NEXT . . . STEP.
    a. Determine the function of the statement.
    b. Trace the execution of the program.
    c. Debug programs that use variations of the FOR . . . NEXT . . . STEP.
10. Laboratory Lesson. Write programs for problems that include:
    a. Calculating simple interest
    b. Finding averages
    c. Finding the mode for a group of scores
    d. Using the computer as a tool to gain insight into a problem; e.g.,

    (1) A Problem: A boy and his sister visited a farm where they saw a pen filled with pigs and chickens. When they returned home, the boy reported that he saw 18 animals in all, and his sister remembered that she had counted a total of 50 legs. How many pigs are in the pen?

    The Programming Problem: Write a program which will print out the number of pigs, chickens, and the total number of legs for all combinations of pigs and chickens that add up to 18 animals.

    (2) Another Problem: A carpenter agrees to work under the following conditions: He is to be paid $10 a day for his work for every day he works, but will be fined $12 for every day he misses. At the end of 30 days he has worked just enough days so as not to lose anything. Write a program which will print out the number of days worked, days absent, net pay. What is the solution?

Note: These two problems were written by Donald T. Piele and can be found in Creative Computing, August, 1981, pp. 110-112.

11

Computer Applications:

Data Processing, Control, Design

Purpose: As a result of this unit students will identify the three major categories of computer applications, i.e., data processing, control, design (model), and will determine whether or not a given problem would be a practical application for a computer.

Resource Materials:

1. Are Yo Computer Literate? by Karen Billings and David Moursund. "Smart Machines," pp. 55-67; "How Computers are Being Used," pp. 69-89; "How Computers Affect People," pp. 91-109.
2. Data Processing, Control, Design: Personal Computer Applications (Adventure of the Mind series); and It's on the Computer, The New Media, Let's Pretend, In Control (Computer Programme series).
3. Demonstration: Abington School District NCR-8455 computer system.
4. General Encyclopedias; e.g., Encyclopedia Britannica, Collier, Merit Student Encyclopedia, World Book.
5. "Using Computers," in Fundamentals of Digital Computers by Donald D. Spencer, pp. 9-41.

Teacher Preparation:

1. Prepare to show and discuss the video cassette, Data Processing, Control, Design: Personal Computer Applications.
2. Arrange for a demonstration of some applications of the Abington School District NCR-8455 computer system.

Computer Applications: Data Processing, Control, Design

Content Objectives:

1. To recognize the data processing capabilities of computers; e.g., computers provide the recording, classifying, calculation, sorting, retrieving, updating, text editing (word processing), and report generating needs of schools, banks, libraries, telephone and telegraph systems, research institutes, postal systems, newspaper offices.
2. To recognize the process control and decision-making capabilities of a computer system; e.g., measuring, timing, and sensing devices, assembly line robots.
3. To recognize that computers are used to simulate or model aspects of reality; i.e., making something act like the real world where there are cause and effect, strong and weak influences, thresholds and limits, chance events, cooperation and competitive situations.

Presentation Activities: [Lesson 24]

1. (15 min.) Show the video cassette Data Processing, Control, Design: Personal Computer Applications.
2. Demonstrate some of the uses of the school district NCR-8455 computer; e.g., payroll, fund accounting, library acquisitions, school-age census, tax receipts, computer-assisted-instruction.
3. Generate a discussion, based on video presentation and NCR-8455 demonstration, that will focus on:
    a. What are the three major classes of computer applications? Give two or more illustrations of each class of application.
    b. Give some illustrations of practical and impractical applications for a computer. For example, if we designed a computer system to turn the pages of a book as we read it, would that be a useful application of a computer for...
        (1) a person in normal health?
        (2) a handicapped person unable to use the hands?
4. Optional Activity: Arrange with the school librarian to reserve space and time during the school day for students, in small groups, to view at least one of the following video cassettes: It's on the Computer, The New Media, Let's Pretend, and In Control from the BBC-TV Computer Programme series.

12

Controlling the Computer, Part V

Purpose: As a result of this unit students will recall and write programs using the five-step program development process. Students will write programs that include: CLS, PRINT, END, LET, GOTO, IF . . . THEN, INPUT, READ-DATA, FOR . . . NEXT . . . STEP, RANDOM, and RND. Students will use the cassette recorder to save and load programs and the line printer to print or list programs.

Resource Materials:

1. "Beginning BASIC" in Computer Literacy by Carin Horn and James Poirot, pp. 227-273.
2. Computer Programming in the BASIC Language (2nd edition) by Neal Golden.
3. Creative Computing Magazine.
4. Getting Started with TRS-80 BASIC: Use with Models I and III.
5. The Secret Guide to Computers (Volumes 1 and 2) by Russell M. Walter.
6. TRS-80 Model III: Operation and BASIC Language Reference Manual.

Teacher Preparation:

1. Prepare a series of three lessons for introducing and practicing the Random Number function:
    a. RND (function)
    b. RANDOM (statement)
2. Prepare to review statements: CLOAD, CLOAD?, CSAVE, LLIST and LPRINT.
3. Prepare a 15 minute quiz that will serve as a review or recall of the major concepts introduced in units ten through twelve.

Controlling the Computer, Part V

4. Have copies of Study Guide Nos. 10 and 16 ready for students.

Content Objectives:

1. To practice using the five-step process for developing computer programs.
2. To write programs using the following BASIC statements: CLS, PRINT, END, LET, GOTO, IF . . . THEN, INPUT, READ-DATA, FOR . . . NEXT . . . STEP.
3. To write programs using the RND function.
4. To practice using the cassette recorder and the line printer.

Presentation Activities: [Lessons 25, 26 and 27]

1. Distribute Study Guide No. 16. Introduce the RND function. Write a program that will simulate a coin tossing experiment.
2. Laboratory Lesson. Write programs to guess a mystery number. The program may require clues, a restrictive number of guesses, input range, and a prompt message, such as "Do you want to play again?"
3. Laboratory Lesson. Distribute Study Guide No. 10. Generate practice activities that will require using the cassette recorder as an input-output device and the line printer as an output device.
   Give a quiz to measure recall of major concepts introduced in units ten through twelve.

13

Advantages and Disadvantages of Computers

Purpose: As a result of this unit students will identify three or more advantages and three or more disadvantages of computers. They will recognize examples of potential invasion of privacy by computers and examples of some steps that might be taken to prevent this happening.

Resource Materials:

1. Best of Creative Computing (Volumes 1, 2, and 3) by David Ahl.
2. The Compleat Computer by Dennie L. Van Tassel.
3. "Computers and Humans" in Computer Literacy by Carin Horn and James Poivot, pp. 133-143.
4. For Better or For Worse: Advantages and Disadvantages of Personal Computers (Adventure of the Mind series); The Thinking Machine and Things to Come (Computer Programme series).
5. "How Computers Affect People," in Are You Computer Literate?" by Karen Billings and David Moursund.
6. Tales of the Marvelous Machine by Robert Taylor and Green Burchenal.

Teacher Preparation:

1. Prepare to show and discuss the video cassette, For Better or For Worse: Advantages and Disadvantages of Personal Computers.
2. Choose a short story to read aloud to the sutdents. The content may be humorous and should reveal surprising comparisons between computers and humans. Appropriate story sources include Best of Creative Computing (Volume 1, 2, and 3), The Compleat Computer, and Tales of the Marvelous Machine.

Advantages and Disadvantages of Computers

Content Objectives:

1. To know the effects of computerization on employment; e.g., automation, job displacement, retraining, change in types and levels of skill necessary for certain jobs.
2. To recognize the potential that computers have to eliminate tedious assembly line labor and hazards and to raise the productivity of American industry.
3. To know examples and possibilities of disruption and disaster by failure of computerized systems; e.g., bank errors, electricity black-outs, ground and air traffic collisions, nuclear accidents.
4. To know the issues relating to privacy in the use of computerized information systems; e.g., limitations on access, human rights, criminal manipulation of files, illegal use of data.
5. To know issues relating to security in the use of computerized information systems; e.g., use of codes, passwords, and cyphers.
6. To know arguments for and against regulation of the computing profession; e.g., magnitude of thefts, difficulty and cost of prevention or apprehension.

Presentation Activities: [Lessons 28 and 29]

1. Ask the students, as a class or in small groups, to make a list of complaints about computers. During the discussion of the results focus on:
    a. A particular incident where someone was a victim of a computerized error.
    b. How difficult it was to get the error corrected.
    c. Other problems that might arise with the rapidly increasing use of computers.

Advantages and Disadvantages of Computers

2. Read aloud in class one short story whose content may reveal surprising comparisons between computers and humans.

3. (15 min.) Show the video cassette For Better or For Worse: Advantages and Disadvantages of Personal Computers.

4. Generate a follow-up discussion, based on the short story and the video cassette, that will focus on:

   a. What applications of computers do you (students) fear or desire the most? Why?

   b. What are the potential disadvantages of wide spread use of computers?

      (1) Increase danger of unauthorized accessibility to information.
      (2) Eliminate jobs.
      (3) Cost.
      (4) Lack of standardization.
      (5) Extra training required.
      (6) Dependence.
      (7) Need for back-up.
      (8) Error in—error out.
      (9) Multiple impact of errors.
      (10) Increased responsibility for actions.

   c. What are the potential advantages of wide spread use of computers?

      (1) Make information readily available.
      (2) Eliminate tedious labor.
      (3) Handle large amounts of data.
      (4) Create jobs.
      (5) Save money.
      (6) Facilitate and increase communication.
      (7) Provide rapid and highly accurate results.
      (8) Increase leverage or power of action.

   d. What are some of the steps that might be taken to prevent

the abuse of computers in our society?

5. Optional Follow-up Activities:
   a. Hold a debate on the resolution: Be it resolved that computer technology has improved the quality of life.
   b. Find some examples of computer-related frauds. How was the fraud perpetrated? Who was to blame? How could the fraud have been prevented?
   c. If you were given the free use of a computer for one year (including the help of a programmer), what would you do?
   d. Suppose your school has just decided to automate student elections. Student voters will mark their choices on a mark sense card with a special pencil; then the cards will be read and counted by data-processing machines. What safeguards will you suggest so no one can "fix" the election in the school district data-processing center?
6. Optional Acitivity: Arrange with the school librarian to reserve space and time during the school day for students, in small groups, to view at least one of the following video cassettes: The Thinking Machine and Things to Come from the BBC-TV Computer Programme series.

14

Controlling the Computer, Part VI

Purpose: As a result of this unit students will write programs that use some of the graphics capabilities of the TRS-80. Students will recognize, also, the general purposes and programming efficiencies resulting from the use of subroutines.

Resource Materials:

1. Computer Programming in the BASIC Language (2nd edition) by Neal Golden.
2. Getting Started with TRS-80: BASIC Use with Models I and III.
3. Introduction to Graphics TRS-80 Edition by John P. Grillo and J. D. Robertson.
4. The Secret Guide to Computers (Volumes 1 and 2) by Russell M. Walter.
5. Sound and Moving Pictures (Computer Programme series).

Teacher Preparation:

1. Prepare a series of four lessons for introducing and practicing the following graphics and subroutine concepts:
    a. Graphics statements and functions: SET, RESET, POINT, CLS, PRINT TAB, PRINT @, and ASCII Codes and Character Set.
    b. Subroutine statements: GOSUB . . . RETURN, ON . . . GOTO, and ON . . . GOSUB . . . RETURN.
2. Have copies of Study Guide Nos. 17A, B, and C ready for students.
3. Choose some programs that include subroutine statements for analysis and debugging.

Content Objectives:

1. To write programs using the following BASIC statements and functions: SET, RESET, POINT, CLS, PRINT TAB, and PRINT @.

Controlling the Computer, Part VI

2. To create graphics on the TRS-80 video display and line printer.
3. To explain the general purposes of the GOSUB . . . RETURN, ON . . . GOTO, and ON . . . GOSUB . . . RETURN statements.
4. To understand that programs are more efficient by using subroutine statements.

Presentation Activities: [Lessons 30, 31, 32 and 33]

1. Distribute Study Guide Nos. 17A, B and C. On the chalk board introduce and flowchart problems that use the following graphic statements and functions: SET, RESET, POINT, CLS, PRINT TAB, and PRINT @. Introduce the ASCII Codes and Character Set.
2. Optional Laboratory Lesson.
    a. Write programs using the graphic statements and character set.
    b. Create graphics on the TRS-80 video display to produce characters for such things as game boards, space ships and schematics.
    c. Create graphics on the line printer using such devices as letters, digits and symbols to form outlines, silhouettes and graphs.
3. Introduce the subroutine statements: GOSUB . . . RETURN, ON . . . GOTO, and ON . . . GOSUB . . . RETURN. Emphasize that by using these statements a program can be made to do more with fewer steps. It not only saves typing but saves memory.
4. Optional Laboratory Lesson. Use practice exercises which include subroutines.
    a. Determine the function of the subroutine.
    b. Trace the execution of the program.
    c. Debug a program using subroutines.
    d. Write a program using subroutines.
5. Optional Activity: (25 min.) Show the video cassette, Sound and Moving Pictures (Computer Programme series).

15

Practice and Recall of Major Computer Literacy Concepts, Part II

Purpose: As a result of these two lessons students will practice and recall the major concepts introduced in units one through fourteen.

Resource Materials:

1. Computer Literacy Curriculum Guide, units one to fourteen.
2. Abington School District Computer Literacy Assessment, Part II.

Teacher Preparation:

1. Prepare to review the major concepts introduced in units one through fourteen. Emphasize units ten through fourteen.
2. Prepare practice exercises for review.
3. Prepare to review study guides with the students.

Content Objectives:

1. To review and practice the major concepts introduced in units one through fourteen.
2. To test for recall of the major computer literacy concepts.

Presentation Activities: [Lessons 34 and 35]

1. Guide the students through a review of their computer literacy notebooks. Call attention to the information included in Study Guides Nos. 1-17.
2. Assign practice exercises that include the following BASIC statements and functions: CLS, PRINT, END, LET, GOTO, IF . . . THEN, INPUT, READ-DATA, FOR . . . NEXT . . . STEP, RND, RANDOM, SET, RESET, POINT, PRINT TAB, AND PRINT @.
3. Test for recall. Use the Abington School District Computer Literacy Assessment, Part II.

16

Interacting with Computer Software Programs, Part II

Purpose: As a result of this unit students will recognize the types of popular consumer software programs on the market for use in education, business, and recreation; and they will apply standards for assessing the effectiveness of a program in performing a particular task or solving a particular problem.

Resource Materials:

1. Samples of commercially produced software programs.
2. Games and utility programs listed in books and magazines:
    a. BASIC Computer Games TRS-80 Edition by David Ahl.
    b. Creative Computing Magazine.
    c. More BASIC Computer Games TRS-80 Edition by David Ahl.
    d. Some Common BASIC Programs by Poole and Borchers.
3. Model programs created by teachers and students.

Teacher Preparation:

1. Select sample software programs that illustrate computer applications for education, business, and recreation.
2. Prepare to load several different types of programs from cassette(s)/ disk onto the microcomputers.
3. Prepare to discuss the purpose of each program and the standards for assessing its effectiveness.

Content Objectives:

1. To recognize the type and uses of microcomputer software in education,

in business, and in recreation.

2. To apply standards for assessing the effectiveness of a program in performing a particular task.

Presentation Activities: [Lesson 36]

1. Have the students interact with a variety of microcomputer software programs.
2. Generate a discussion on the types of tasks performed by the software programs. Focus the discussion questions on the potential uses of a particular program in the classroom, in the home, in the business community. Ask students to:
    a. Describe the major strengths of the program.
    b. Describe the major weaknesses.
3. Through a brainstorming process, generate a list of standards (criteria) to use when assessing the effectiveness of a particular software program.

Study Guides

1	History of Computing	43
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4	LET, Variable Names, and Order of Operations	49
5	Flowcharting Symbols	51
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ABINGTON SCHOOL DISTRICT
Abington, Pa. 19001

Computer Literacy Course
Study Guide No. 1
Revised 7/82

Name:_____
Date:_____

HISTORY OF COMPUTERS: A TIME LINE

Abacus	3000 B.C.	Ancient Civilizations
Analog computing ...Logarithms ...Slide rule	1600	John Napier ("Napier's Bones")
Mechanical digital computing ...Addition and subtraction ...Multiplication and division "Stepped wheel"	1700	Blaise Pascal (1642) Gottfried Leibnitz (1671)
Arithmetic operation controlled by the reading of punched cards	1800	Joseph-Marie Jacquard (1801)
Automatic digital computing Concept	1820 1840	Charles Babbage (1832-1834) Ada Lovelace
Punched cards to mechanize U. S. Census	1880 1900	Herman Hollerith (1886)
Electro-mechanical relays Vacuum electron tube	1940	Harvard Mark I (1937) ENIAC, Univ. of Pa. (1946)
Stored-programs	1950	UNIVAC I (1959)
Transistors Magnetic storage Integrated circuits (LSI) Microprocessor	1960	TRANSAC S-2000 (1960) ALTAIR 8800 (1975)
Magnetic bubble chip Very large-scale integrated circuit (VLSI)	1980	TRS-80 Model III, Apple II

Some Highpoints

1600's Napier's Bones: rods made of wood or bone; used for multiplying.

1642 Pascal's Arithmetic Machine: mechanical calculating machines that added and subtracted by means of rotating toothed wheels. Pascal is credited for inventing the forerunner of the modern desk calculator.

1672 Liebnitz's Stepped Reckoning Machine: a calculating machine that performed the multiplication process by repeatedly adding.

1801 Joseph-Marie Jacquard perfected a punched-card controlled loom for the weaving industry.

1832-1834 Babbage's Analytical Engine: a design for a card-programmed general purpose automatic computer. It used punched cards for input and mechanical wheels for computation. Output was by printing or by punching cards. The arithmetic unit could do the four basic operations of addition, subtraction, multiplication, and division. The annotated translations of Ada Augusta, Countess of Lovelace, are the best accounts of Charles Babbagge's machine available and establish Lady Lovelace as an important 19th century mathematician. ADA, a U. S. Department of Defense programming language, is named in honor of her contributions to computing.

1890 Hollerith's Tab Machine: a machine used at the U. S. Census Bureau to mechanize census data processing for the 1890 census. It recorded, compiled, and tabulated census information recorded on punched cards.

1944 Howard Aiken at Harvard and IBM developed Mark I, 1939-1944, a large scale electro-mechanical relay calculator.

1946 J. Presper Eckert and John W. Mauchly of the Univeristy of Pennsylvania built ENIAC, 1943-1946 . It was the first fully electronic digital computer. Vacuum tubes rather than relays controlled the operation of the computer.

1947 John Von Neumann, mathematician and consultant for the Los Alamos Scientific Laboratory, introduced to the scientists working on the ENIAC project the concept of using a stored program.

1951 UNIVAC I: first mass-produced and commercially available computer. It handled both numbers and alphabetical characters.

1960 TRANSAC S-2000: the first transistorized computer.

1975 ALTAIR 8800: the first home computer.

Computer Generations

First Generation Computers, 1946-1958 : machines that used vacuum tubes.

Second Generation Computers, 1959-1964 : logic circuits controlled by transistors and memory units composed of magnetic cores.

Third Generation Computers, 1964-? : machines that used large integrated circuits and miniaturization of components to replace transistors, reduce costs, work faster, and increase reliability.

Fourth Generation Computers, 1975-? : machines that make extensive use of the microchip technology. The microcomputer chip not only contains the CPU but also includes on the same piece of silicon, a RAM, a ROM, and input/output circuitry.

ABINGTON SCHOOL DISTRICT
Abington, Pa. 19001

Computer Literacy Course
Study Guide No. 2

Name:_____
Date:_____

BEGINNING COMMANDS AND STATEMENTS

1. Video Display
   a. Cass? _____
   b. Memory Size? _____
   c. Ready_____
   d. Cursor_____
   e. Prompt _____
2. Keys
   a. ENTER _____
   b. Backspace _____
   c. Spacebar _____
   d. CLEAR _____
   e. SHIFT _____
3. Programming
   a. Line number _____
      _____
4. Commands
   a. NEW _____
      _____
   b. RUN _____
      _____
   c. LIST _____
      _____
5. Statements
   a. CLS_____
      _____
   b. PRINT _____
      _____
   c. END_____
      _____

ABINGTON SCHOOL DISTRICT
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Computer Literacy Course
Study Guide No. 3
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Name:_____
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POWERING UP THE TRS-80

1. How is the TRS-80 unit powered-up?_____
2. What is the first thing that appears on the video display?_____
3. What does "Cass?" mean? What is the response?_____
4. What is your response to "Memory Size?" ?_____
5. What do you see on the screen after you have responded to "Memory Size?"?_____
6. What is the blinking box that appears on the screen?_____
7. What happens after NEW is typed and entered?_____
8. If you make a typing mistake before using the ENTER key, how do you correct your mistake?_____
9. If you typed an entire line incorrectly, how could you correct your mistake?_____
10. How is a line "fed" into the computer's memory?_____
11. What are some common mistakes made while operating the computer?_____
12. How can you find out if your program is stored in the computer?_____
13. How do you get the computer to execute your program?_____

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LET, VARIABLE NAMES AND ORDER OF OPERATION

1. LET Statement: Assigns the value or expression on the right of an equal sign to the variable on the left of the equal sign.

Correct examples:	Incorrect examples:
20 LET A=3	20 LET 2=A
20 LET R=S+T	20 LET B+C=A

2. Variable Names

   a. Numeric variables are names which represent numbers. They must begin with a letter (A to Z) and may be followed by another letter or digit (0 to 9).

      Examples: X, AA, T8

   b. String variables are names which represent strings (groups of keyboard characters such as names or addresses). They must begin with a numeric variable and the character "$".

      Examples: A$, BC$

3. Order of Operations

   a. Operations in parentheses (in the order as given in b and c below)

   b. Multiplication and division (left to right)

   c. Addition and subtraction (left to right)

How About These?

What is the output in each of the following programs?

```
10 CLS
20 LET A=3
30 LET B=6
40 LET C=A+B
50 PRINT C
60 END
```

```
10 CLS
20 LET A$="JOHN"
30 LET T=6
40 PRINT A$, T
50 END
```

```
10 CLS
20 LET B$="A="
30 LET A=21
40 PRINT B$;A
50 END
```

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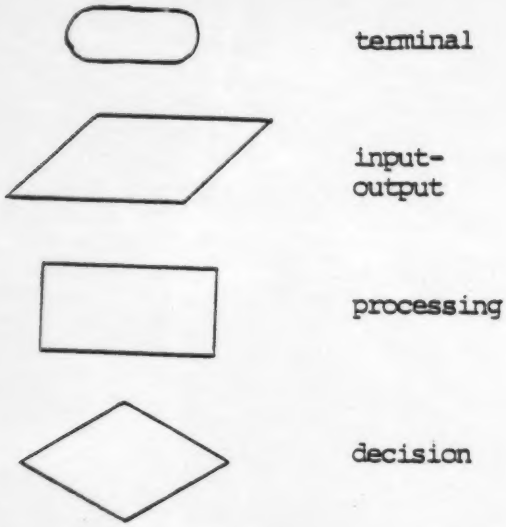
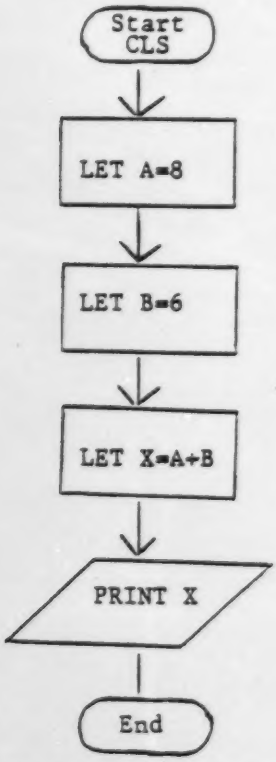
FLOWCHARTING SYMBOLS



1. Using your own program line numbers and correct language, write a BASIC program for the problem that is flowcharted below.



2. What is the output of the above program?

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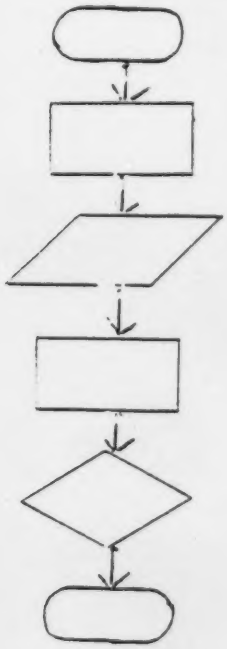
INEQUALITY SYMBOLS

Name	Mathematical Symbol	Computer Symbol
Greater than	$>$	>
Less than	$<$	<
Greater than or equal to	$\geq$	>=
Less than or equal to	$\leq$	<=
Not equal to	$\neq$	<>

Example of a program using "IF...THEN" and a counter:

```
10 CLS
20 LET C=1
30 PRINT "THIS WILL BE PRINTED TEN TIMES"
40 LET C=C+1
50 IF C <= 10 THEN GOTO 30
60 END
```

Complete the flowchart for the "IF . . . THEN" and counter program shown in the above example.



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Name:_____
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COMPUTER TERMINOLOGY, PART I

A. Define the following computer-related words:

1. ROM_____
2. RAM_____
3. BIT_____
4. BYTE_____
5. Memory size_____
6. K _____
7. POKE_____
8. PEEK_____
9. Binary numeration_____

B. Do you recall these words? Give a definition or example for each word:

1. RUN_____
2. LIST_____
3. NEW_____
4. BREAK_____
5. BACKSPACE_____
6. SPACEBAR_____
7. ENTER_____
8. GOTO_____
9. IF . . . THEN_____
10. CLS_____
11. LET_____
12. END_____
13. CONT_____
14. Variable_____
15. PRINT_____

Continue on page 56.

C. What are some common applications of the following programming languages:

1. BASIC_____

2. COBOL_____

3. FORTRAN_____

4. Logo_____

5. Pascal_____

6. Smalltalk_____

7. Pilot_____

8. ADA_____

9. Assembler_____

10. Machine_____

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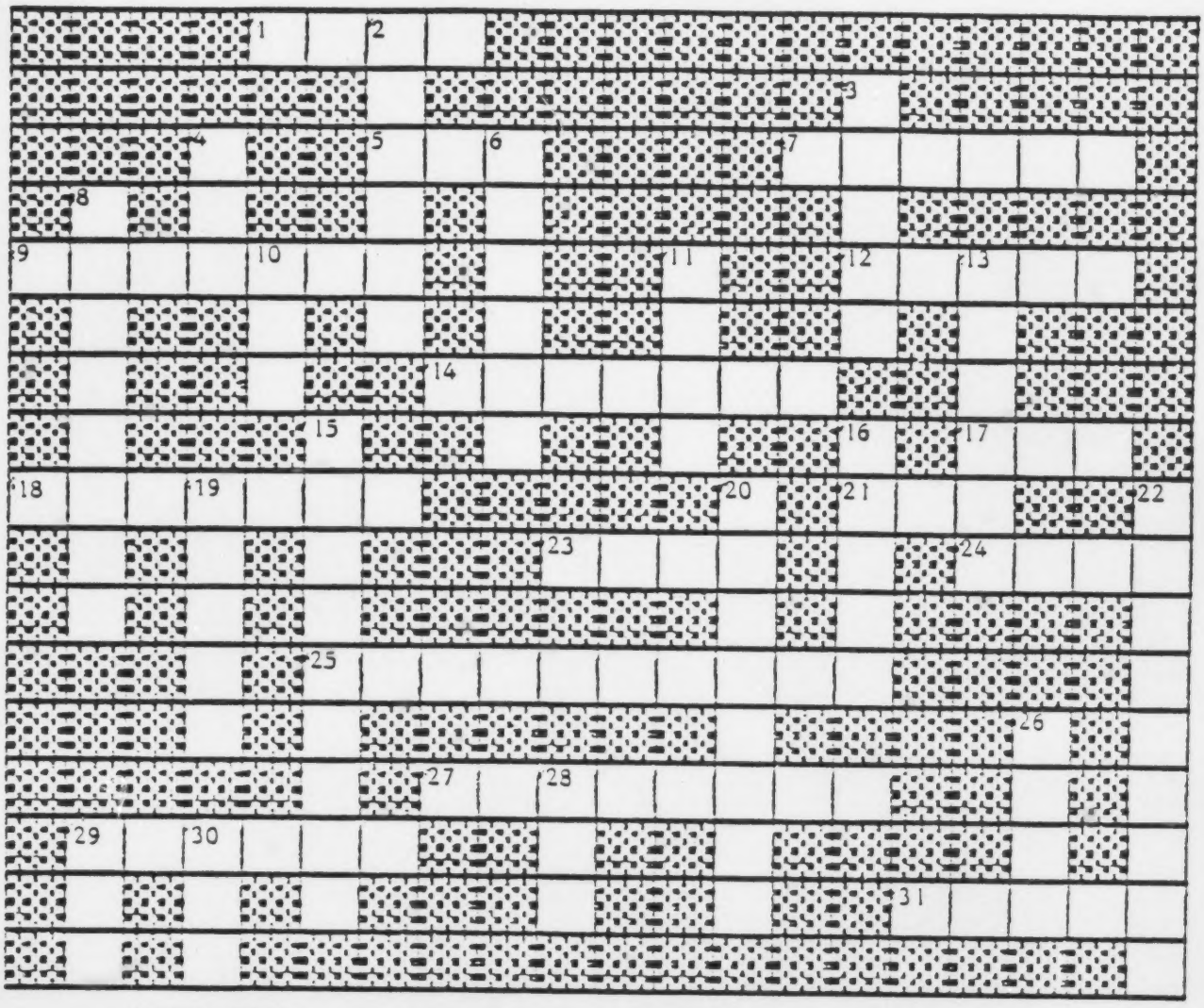
COMPUTER LITERACY Revised 7/82



Across Clues

1. Command that prints program code
5. Memory you can't change
7. First commercial computer
9. Programming language developed to solve scientific problems
12. Brand name for popular microcomputer
14. Output device (paper)
17. Abbr. for "HEART" of a computer
18. Co-inventor of ENIAC
21. New, U.S. Dept. of Defense, Programming Language
23. Term used to describe memory system density
24. Programming language designed to be a learning tool for children
25. Refers to the ways in which humans and machines are similar
27. Physical equipment of a computer system
29. System based upon two possibilities
31. Data to be accepted by the computer

Down Clues

2. Type of variable identified by a dollar sign ($)
3. First general purpose electronic digital computer
4. Abbr. video monitor, television
6. Computer storage device
8. Wrote operating instructions for Babbage's machines
10. Memory you can change
11. Command used to loop
13. Early inventory of a gear-driven calculating machine
15. Diagram representing the strategy needed to solve a problem
16. Abbr. Beginners All-purpose Symbolic Instruction Code
19. Abbr. Common Business Oriented Language
20. Computer programs
22. Inventor of census machinery
26. Series of program statements that are repeated
28. Command to execute a program
29. Term used to describe an error
30. Clears instructions and data from memory

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INFLUENCE OF COMPUTERS ON DAILY ACTIVITIES

1. List <u>three or more</u> ways in which a computer may be used to enhance an individual's mental capabilities. Base your answer on the information provided in the video cassette, <u>The Personal Touch: Computers as Personal Tools</u>.

   a._____

   b._____

   c._____

2. List <u>ten or more</u> ways a general purpose computer may be used...
   a. in the home?

   _____
   _____
   _____

   b. in education?

   _____
   _____
   _____

   c. in business?

   _____
   _____
   _____

   d. in medicine?

   _____
   _____
   _____

   e. in art and music?

   _____
   _____
   _____

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THE CASSETTE RECORDER

1. Loading a program
   a. Check that the recorder's volume setting is between 5 and 7.
   b. Press the recorder's PLAY key.
   c. Type CLOAD on the TRS-80 and hit the ENTER key.

   These steps will start the tape in motion and an * [asterisk] will appear on the top line of the screen; a second * [asterisk] will be blinking. When loading is done, the recorder will stop and READY will appear on the screen. Type the command RUN and hit the ENTER key.

2. Saving (Recording) a program
   a. Check that the recorder's volume setting is between 5 and 7.
   b. You can not record on the leader portion (blue mylar) of the tape. If your tape has a leader, advance the tape past it.
   c. Press the recorder's PLAY and RECORD keys simultaneously.
   d. Type CSAVE followed by a one-letter "file-name" in quotes on the TRS-80 and hit the ENTER key. Example: CSAVE "A"

   These steps will start the tape in motion and be finished when READY appears on the screen. To check your success in storing the program, rewind your tape and hit the recorder's PLAY key. Type in CLOAD?, and hit the ENTER key. If it was an unsuccessful save, the message "BAD" will appear on the screen. In this case you must CSAVE the program again.

3. Other Helpful Hints
   a. Check that your recorder is connected at the rear of the TRS-80. This is important, especially if a NETWORK SYSTEM is available since both the recorder and network use the same connection.
   b. Use the recorder's tape counter to aid you in locating programs on the tapes.
   c. When you are not going to use the recorder for loading or recording programs, do not leave RECORD and PLAY keys down (press STOP).
   d. To check if a tape has a program recorded on it, you can disconnect the plug from the EAR jack and listen to the program material from the speaker.
   e. If either CSAVE or CLOAD is not working properly during operation, then it will be cancelled by pressing the BREAK key.

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READ-DATA & INPUT

The READ and DATA statements can be used instead of LET or INPUT to enter information into the computer for use in your program.

Look at the following program:

```
10 READ N
20 PRINT N
30 DATA 123.4
40 END
```

The READ statement takes the value from the DATA statement and stores it in N. The DATA statement may appear anywhere in the program. As soon as the computer comes to the READ statement, it will look for a DATA statement. If there are no READ statements, the computer will ignore the DATA.

BE CAREFUL: Even though the DATA can be put anywhere in the program, it is a good idea to put it in the same position each time you write a program. Some people put in DATA right after READ, others put all DATA at the end of the program. If you will be changing DATA frequently, it is a good idea to put DATA at the end of the program. This way it is less likely that you will make a mistake that will affect the rest of your program.

Look at the following program:

```
10 READ A, B, C
20 PRINT A, B, C
30 DATA 2, 4, 6, 8, 10
40 DATA 12, 14, 16, 18, 20
50 END
```

The READ statement will make the computer look for DATA. According to this program A=2, B=4, C=6. Notice that there is more DATA than the program needs. The computer will just ignore the rest, unless it comes across another READ statement later in the program.

IMPORTANT: Every time you have a READ statement, you must have a DATA statement with enough data to run the program. Otherwise you will get the OD error message. OD means "out of data."

READ-DATA & INPUT

The program from the previous page can be rewritten using a loop so that there are not so many variables:

```
 10 READ X
 20 IF X =99999 THEN GOTO 100
 30 PRINT X
 40 GOTO 10
 50 DATA 2, 4, 6, 8, 10
 60 DATA 12, 14, 99999
100 END
```

As soon as the computer sees the READ statement, it looks for the DATA. It checks the value for X in line 20. If the X value doesn't equal 99999, then it prints X, and the GOTO statement creates the loop. When the counter comes to the number 99999, the program ends. The number 99999 is known as a flag. It is not printed on the screen. When the flag, 99999, is read, it causes the program to end. Otherwise, the computer would go through all the data and then print the error message OD . Now, change the data in the above program to print the odd numbers from 1 to 15. Do not forget your flag.

The INPUT statement allows you to type in values for variables during program execution. This allows you to interact with the computer while your program is running.

Type the following programs. Notice that when you execute these programs a "?" mark appears. This is known as a prompt. It is used to request information from the user. In these examples, type in any number and hit the ENTER key.

```
10 CLS
20 INPUT A
30 PRINT "YOUR NUMBER WAS"; A
40 END
```

```
10 CLS
20 INPUT "WHAT IS YOUR FIRST NUMBER"; X
30 INPUT "WHAT IS YOUR SECOND NUMBER"; Y
40 PRINT X * Y
50 END
```

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COMPUTER LITERACY TERMINOLOGY, PART II

A. Do you remember these computer-related expressions? Where applicable, define and/or give two or more examples for each expression.

1. Soft copy_____
2. Hard copy_____
3. Software_____
4. Hardware_____
5. Input devices_____
6. Storage devices_____
7. Output devices_____
8. Network_____
9. Machine language(s)_____
10. High-level language(s)_____

B. What is the difference between a dedicated computer and a programmable computer?

_____

C. What invention(s) signaled the change from "first generation" to "second generation" computers?_____

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ERROR MESSAGES

BS	Subscript of the array is beyond DIMensioned range.
CN	A CONT cannot be used at this point.
DD	An attempt was made to reDIMension an array.
FC	Illegal parameter was used. Examples: square root of a negative number, using SET beyond the designated range.
FD	Bad file data from external source, i.e., tape
ID	The use of INPUT as a direct command.
LS	A string that exceeded 255 characters in length.
L3	Item can only be used with the Disk System.
MO	An operand is missing in an attempted operation.
NF	NEXT is used without a matching FOR statement.
NR	RESUME is missing in error-trapping mode.
OD	DATA were left out or insufficient.
OM	All available memory has been used or reserved.
OS	The amount of string space allocated was exceeded.
OV	The number is too large for the computer to handle.
RG	A RETURN statement without a GOSUB.
RW	A RESUME statement without ON ERROR GOTO.
SN	Syntax error. Examples: incorrect punctuation, an open parenthesis, a misspelled statement, a typing error.
ST	A string operation too complex to handle.
TM	A numeric or string variable was assigned incorrectly.
UE	An invalid code was used to generate an error.
UL	An attempt was made to refer or branch to a nonexistent line.
/0	An attempt was made to divide by zero.

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2. Ahl, David H., Editor. Best of Creative Computing, 3 volumes. Creative Computing Press, 1976-1979.

3. Ahl, David H. More BASIC Computer Games, TRS-80 Edition. Creative Computing Press, 1980.

4. Ball, Marion J. and Charp, Sylvia. Be a Computer Literate. Creative Computing Press, 1977.

5. BASIC: An Introduction to Computer Programming (4 filmstrips and cassettes). The Center for Humanities, 1980.

6. Billings, Karen and Moursund, David. Are You Computer Literate? Dilithium Press, 1979.

7. Brown, Richard W. Computers. Jackdaw No. 29, Viking, 1975.

8. Cohen, Daniel. The Human Side of Computers. McGraw-Hill, 1975

9. Computer Programming: Advanced BASIC Techniques (5 filmstrips and 4 cassettes). Educational Activities, 1980.

10. Computer Programming: BASIC for Microcomputers (5 filmstrips and cassettes). Educational Activities, 1980.

11. Corbett, Scott. Home Computers: A Simple Informative Guide. Little, Brown, 1980.

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13. Englehardt, Stanley L. Miracle Chip: The Microelectronic Revolution. Lothrop, 1979.

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15. Getting Started with TRS-80 BASIC: For Use with Models I and III. Radio Shack, 1981.

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LIBRARY RESOURCES FOR STUDENTS, Continued

17. Lipscomb, Susan D. and Zuanich, Margaret A. BASIC Fun: Computer Games, Puzzles, and Problems Children Can Write. Avon Books, 1982.

18. McDaniels, Herman. Careers in Computers and Data Processing. Petrocelli Books, 1978.

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22. Rusch, Richard B. Computers: Their History and How They Work. Simon & Schuster, 1969.

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24. Understanding Computers and Numbers, Unit One: From Pebbles to Programs; Unit Two: From Notches to Numerals. (5 filmstrips and 5 cassettes). Guidance Associates, n.d.

25. Van Tassel, Dennie L. The Compleat Computer. SRA, 1976.

26. Walter, Russell M. The Secret Guide to Computers. 10th edition, 8 volumes. Russ Walter, 1980.

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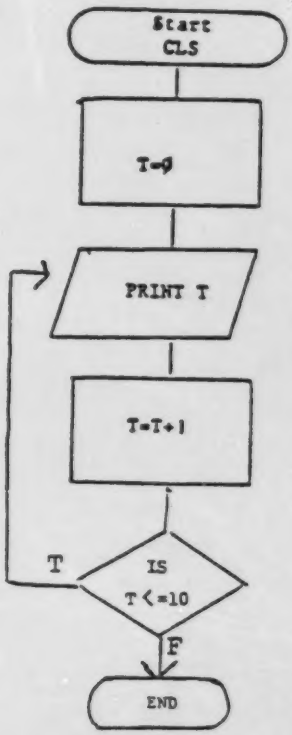
LOOPING TECHNIQUES

Do you recall having a loop in a program such as this one?

```
10 CLS
20 LET T=0
30 PRINT T
40 LET T=T+1
50 IF T<=10 THEN GOTO 30
60 END
```



USE OF FOR AND NEXT

There is another way to write a loop and exit without using an IF...THEN statement. What do each of these programs accomplish?

```
10 CLS
20 FOR X=1 TO 10
30 PRINT X
40 NEXT X
50 END
```

```
10 CLS
20 FOR X=1 TO 10
30 PRINT "ABINGTON"
40 NEXT X
50 END
```

```
10 CLS
20 FOR X=10 TO 20 STEP 2
30 PRINT X
40 NEXT X
50 END
```

Note, a Step of 1 is understood; however, the Step can be any number.

```
20 FOR T = 5 TO 25 STEP  .5
20 FOR T =10 TO  1 STEP  -1
20 FOR T = N TO  J STEP   W
```

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RANDOM NUMBER FUNCTION

1. RND function.

The RND function can produce random numbers between 0 and 1, or random integers from 1 to 32768.

Examples:

RND (52) returns an integer from 1 to 52.

RND (1000) returns an integer from 1 to 1000.

RND (0) returns a value between 0 and 1 (from .000001 to .999999)

2. RANDOM statement.

RND does not generate random numbers, but actually pseudo-random numbers. These are predictable in that if one starts with the same "seed" number, the same sequence of numbers will be generated each time. The RANDOM statement "reseeds" the random-number generator. If RANDOM is not used with RND, then turning the computer off and then on again, will produce the same sequence for each power-up.

Examples:

```
10 CLS
20 RANDOM
30  LET X=RND (20)
40 PRINT X
50 GOTO 30
```

Possible outcomes:

No. 1	No. 2
15	13
6	4
11	2
18	19
2	3
5	6
10	12
7	20
16	4
.	.
.	.
.	.
.	.
.	.

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GRAPHICS: SET, RESET AND POINT

The video display screen of the TRS-80 is made up of thousands of small blocks which are lit according to what you type in. It is possible to control which blocks are on or off and to create pictures on the video screen. These pictures are known as graphics.

The screen is 128 blocks wide. These blocks are numbered from 0 to 127. There are 48 blocks from the top of the screen to the bottom of the screen. These blocks are numbered from 0 to 47.

1. CLS: The first thing you will want to do in any graphics program is to clear the screen. This will remove any unwanted characters. Also, if something appears on the screen that you didn't plan on, you know that there is a mistake in your program.

2. SET (x, y): The SET statement turns on the block at the location determined by x and y. The x value is the number of blocks over from the left side of the screen. The y value is the number of blocks down from the top.

   Example: Suppose you wanted to light the space 12 blocks from the left and 20 blocks from the top—

   a. 12 blocks from the left means that x=11
      (Remember: blocks from the left side are numbered 0 to 127)

   b. 20 blocks from the top means that y=19
      (Remember: blocks from the top are numbered 0 to 47)

   To light the block:

```
10 CLS
20 SET (11, 19)
30 GOTO 30
```

3. RESET (x, y): Turns off the graphics block at the location described by x and y. To turn off the block in the example above, RESET (11, 19)

   Important: In using SET (x, y) and RESET (x, y), remember that $0 \leq x \leq 127$ and $0 \leq y \leq 47$. If the x or y value falls outside of those limits, you will get an error message.

GRAPHICS: SET, RESET AND POINT, CONTINUED

4. POINT (x, y): Tests to see whether the specified graphics block is "on" or "off." If the block is on (that is, if it has been SET) then POINT will return the symbol -1 (the binary symbol for true). If the block is off, then POINT will return 0 (the binary symbol for false).

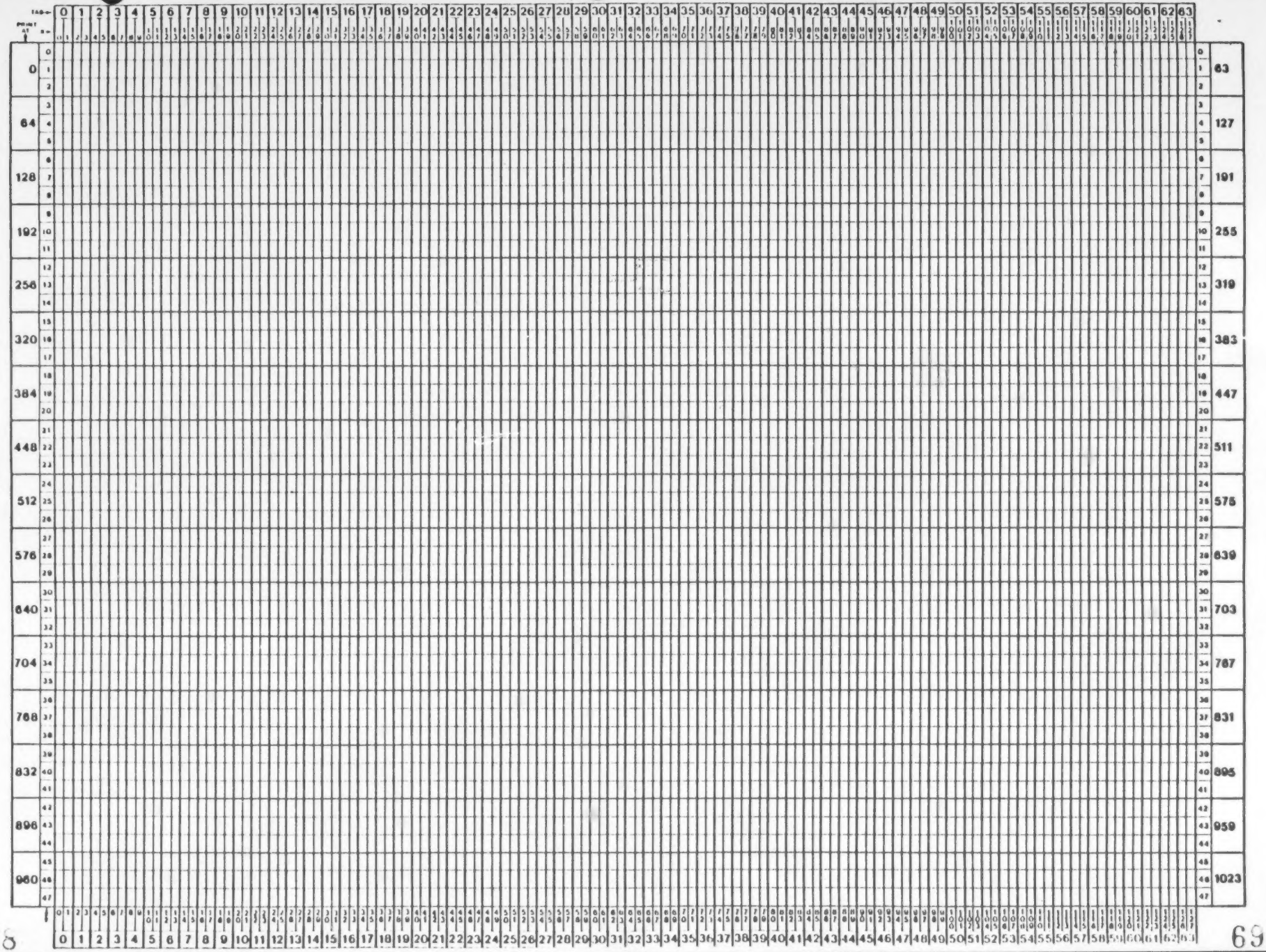
   POINT (x, y) is used with an IF . . . THEN statement, for example:

```
100 IF POINT (x, y)= -1 THEN 200
200 PRINT "BLOCK"; x; ","; y; "is on."
```

APPLICATION

Using a video display worksheet, write your initials in block letters at least 12 blocks high in the center of the sheet. Now write a program so that your initials will appear on the TRS-80 video display screen.

TITLE _____ PROGRAMMER _____ COMMENTS _____ PAGE ____ OF ____



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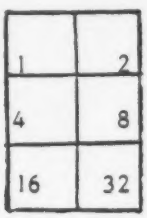
GRAPHICS: GRAPHIC CHARACTERS

In addition to using SET (x, y) and RESET (x, y), graphics on the TRS-80 can also be done by using graphics characters. Each graphics character is contained in a print cell. A print cell is 2 blocks wide and 3 blocks high.

Each graphics character is made up of a print cell, but not all of the blocks are necessarily lit at the same time. Each character has a different code number, depending on which block(s) of the cell are lit. A blank cell (no blocks are lit) has a code number of 128.



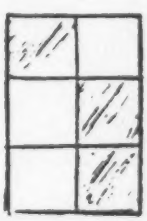
Each block of the cell has a different numeric value. By adding 128 (the blank) plus the value of each square of the cell that is to be lit, you can find the code number for the graphics character.

Special Note: In the following example and in the exercises, a darkened block is used to indicate a block which is lit on the video display screen.

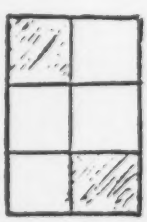
Example: Find the code number for the graphics character at the left
Code = 128 + 1 + 4 + 8 + 16 = 157

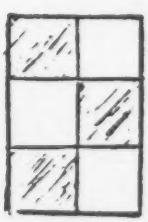
Exercises:

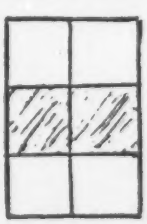
Find the code number for the following graphics characters.

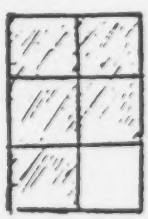
(1.) 

(2.)

(3.) 

(4.) 

(5.) 

(6.) 

ABINGTON SCHOOL DISTRICT

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Computer Literacy Course Name:_____

Study Guide No. 17C Date:_____

GRAPHICS: CHR$, PRINT @, AND PRINT TAB

1. CHR$ (expression): Returns the character having the same code number as the expression in parentheses. Recall that the graphics characters have code numbers 128 through 191.

   Every character on the keyboard, as well as the graphics characters, have code numbers, so the expression in the parentheses may be any number from 0 to 255. Any number outside of that range will return an error message. The expression may also be a variable expression whose value falls in that range.
   For example:

```
100 LET N = 150
200 PRINT CHR$ (N+25)
```

   Since N+25= 150+25= 175 and 175 is in the range of numbers 0 through 255, then this program will print the character having code number 175.

   CHR$ (expression) can assign a specific code to a string variable. For example:

```
10 CLS
20 LET A$= CHR$ (191)
30 PRINT A$; "HELLO"; A$
40 GOTO 40
```

   When run, the program will print: ▀ HELLO ▀

2. PRINT @ position, item list: Lets you start printing anywhere on the screen and specifies where the printing is to begin and what is to be printed.

   The @ position must be a number from 0 to 1023. It is easiest to find that number by using the following formula:

   @ position= R*64+C

   The PRINT @ statement refers to a point cell (made up of 6 blocks) so there are fewer positions than with SET (x,y) and RESET (x,y).

   The letter R in the formula refers to row number. There are 16 rows from top to bottom, and they are numbered from 0 to 15.

   The letter C in the formula refers to the column number. There are 64 rows from left to right, and they are numbered from 0 to 63.

   By knowing the row and column numbers it is easy to find the print position:

   @ position= R*64+C

   The item list is a list of those things that will be printed at the position you have named.

GRAPHICES: CHR$, PRINT @, AND PRINT TAB, CONTINUED

3. PRINT TAB (expression): Moves the cursor to position named by the expression (number) in the parentheses on the current line.

   A line contains 64 spaces numbered from 0 to 63.

   If the cursor is already past the position named, it will ignore the PRINT TAB (expression) statement.

   TAB (expression) may be used several times in a PRINT list.

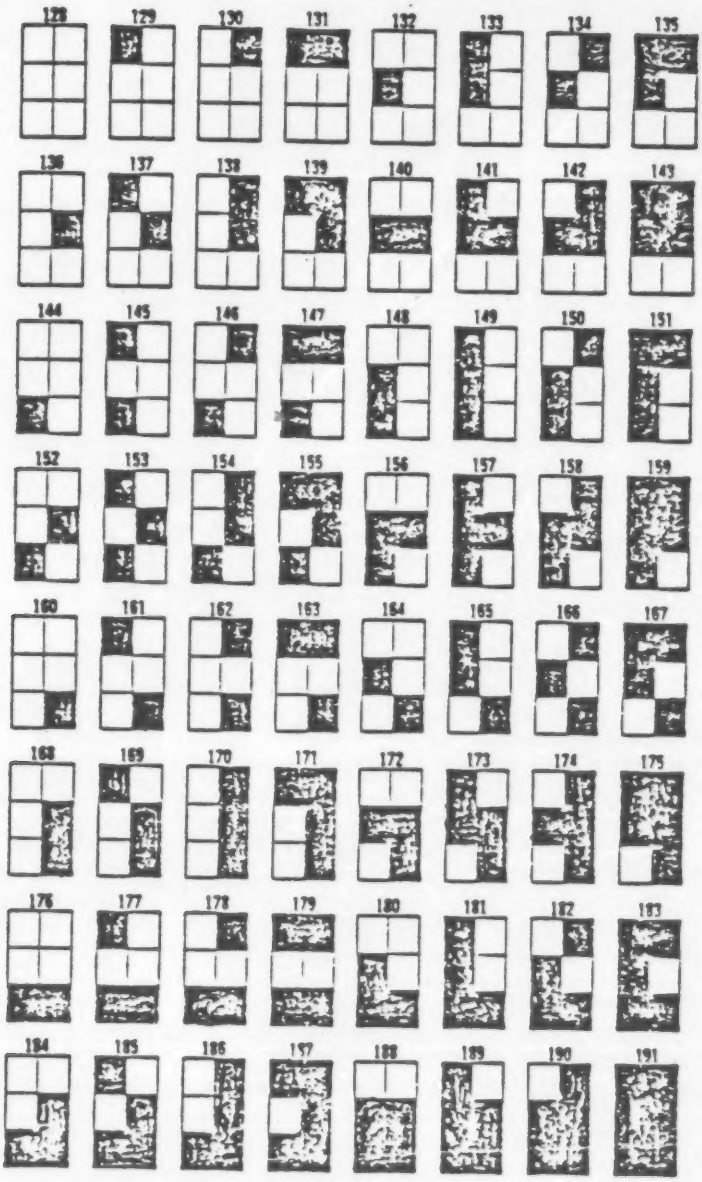
A. Which do you think is easier to use--PRINT @ or PRINT TAB? Why?

B. Which do you think is easier to use--PRINT @ or SET (x, y)? Why? Is one always easier than the other? Give examples.

C. Using a video display worksheet and table of graphics characters, write a program using PRINT @ and CHR$ (exp) that will print your initials in the center of the screen.

Computer Literacy Course

Reproduced from: Programming Techniques for Level II BASIC by William Barden, Jr., Radio Shack, A Tandy Corporation Co., 1980.



TRS-80 graphics characters.

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